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CORRIGENDUM

AN $O(n^{\lg k} \cdot 2^{n/2})$ TIME AND $O(k \cdot 2^{n/k})$ SPACE ALGORITHM FOR CERTAIN NP-COMPLETE PROBLEMS

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J. VYSKOČ

Institute of Technical Cybernetics, Slovak Academy of Sciences, 842 37 Bratislava, Czechoslovakia

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The proof of Theorem 1 in [1] is not correct (thanks are due to A. Ferreira for pointing out this fact), so please replace Theorem 1 and its proof by the following. The rest of [1] remains unchanged.

Theorem 1. *Let* $X=\{x_i \mid i=1,2,\ldots,M\}$, $Y=\{y_i \mid i=1,2,\ldots,N\}$ *and let* $S=X+Y=\{x_i+y_j \mid i=1,2,\ldots,M, j=1,2,\ldots,N\}$. *Then it is possible to generate successively the elements of S in sorted order in time* $O(MN\log_2(\min(M,N)))$ *using only* $O(\min(M,N))$ *additional space.*

Proof. We will consider a heap H keeping pairs (x_i+y_j, j) stored according to the first item. Without loss of generality we will assume $M \leqslant N$.

Algorithm. *Step* 1: sort X and Y;
Step 2: create heap H from $(x_i+y_1, 1)$, $i=1,2,\ldots,M$;
Step 3: **for** $k=1$ **to** MN **do**
$(z, j) = \text{extract\_min}(H)$
$\{z$ is the kth element of $X+Y\}$
$\text{insert}(z-y_j+y_{j+1}, j+1)$ into H
od.

Complexity (we will not account for the space necessary to store X and Y): See Table 1. □

Table 1

Step	Time	Space
1	$O(M\log_2 M + N\log_2 N)$	no additional space
2	$O(M)$	$O(M)$
3	$O(MN\log M)$	$O(M)$

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Our algorithm is in fact a variant of Selectsort and its correctness is based on the fact that H contains for each "row" (of $X+Y$) its current minimum (with respect to remaining, i.e., "until this time not used", elements). The heap data structure allows us to find quickly a global minimum from local minima, and to update respectively a new local minimum. Successive generation of global minima gives us all the elements of $X+Y$ in nondecreasing order.

Reference

[1] J. Vyskoč, An $O(n^{\lg k}\cdot 2^{n/2})$ time and $O(k\cdot 2^{n/k})$ space algorithm for certain NP-complete problems, *Theoret. Comput. Sci.* **51** (1987) 221-227.